

REMARKS/ARGUMENT

Applicant responds herein to the Office Action dated June 18, 2002. A Petition for Extension of Time (one month) and the fee therefor, are attached.

In preparing a response to the instant Office Action, the applicant has reviewed the specification and has made minor amendments to the language of the specification, to improve the idiomatic usage of English and to correct obvious typographical errors. The Examiner is respectfully requested to view, approve and enter the amendments to the specification herein.

Claims 1, 3 and 4 stand rejected on grounds of obviousness over Sivaramarichnam, et al. (5,879,574), in view of Adams, et al. (5,085,887). Claim 2 stands rejected on grounds of obviousness over the aforementioned references, further in view of Amano, et al. (5,948,485). Reconsideration of these rejections on art is requested in view of the amendments to the claims herein and the following remarks.

Preliminarily, the apparatus of the present invention is intended for use in connection with atomic layer deposition (ALD) and is not a general purpose chemical vapor deposition device. Therefore, it is worth noting that all of the cited references show only a general apparatus for chemical vapor deposition, and not for atomic layer deposition.

More specifically, and in contrast to the cited references, the present invention teaches and claims providing at least two gas supply pipes for supplying at least two material gases into the reactor chamber to form an ultra-thin film on the substrate. It further teaches at least two gas supply controllers respectively installed at the gas supply pipes to supply the material gases alternately into the chamber. The invention, as amended, further includes at least two remote plasma generators installed outside the reactive chamber and respectively connected to the gas supply pipes for activating the material gases supplied through the gas supply pipes.

Turning to the references, the '574 patent teaches a chemical vapor deposition apparatus which allows multiple process steps to be formed in situ in the same chamber to reduce the total processing time. The disclosed apparatus comprises an enclosure housing processing chamber, the enclosure including a gas inlet and gas outlet. The gas inlet communicates with the chamber for receiving a cleaning gas capable of reacting with unwanted residue in the chamber in a

cleaning process to produce clean gas reactants. The gas outlet discharges a used cleaning gas and the cleaning gas reactants from the chamber. An end point detection assembly coupled to the gas outlet determines when the cleaning process in the chamber has been substantially completed by detecting radiation adsorbance of the used cleaning gas and the cleaning gas reactants discharged from the chamber.

Firstly, the Office Action concedes that the '574 reference does not disclose a reactive chamber consisting of an upper container and a lower container junctioned by an O-ring. It is therefore contended that the secondary Adams reference teaches a thermal reactor with a wave reactor chamber with a wafer cover member with a central window and an O-ring.

Nevertheless, neither of the references cited against independent claim 1 discloses the explicitly recited technical elements of the claimed invention, including at least two gas supply lines and at least two remote plasma generators. Rather, these references teach only a single gas supply and only a single remote plasma system. Therefore, the system shown in the cited references could not form a film on a substrate by atomic layer deposition. Several other of the features of the invention are similarly not found in the combined teachings of these references.

Since claim 1 has been established above to distinguish over the prior art, it is not necessary to address the dependent claims, including claim 2, to which the third reference Amano has been cited, because each of these dependent claims imposes further limitations on claim 1 and, as such, is even further distanced from the prior art.

Accordingly, the Examiner is respectfully requested to reconsider the application, allow the claims as amended and pass this case to issue.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Asst. Commissioner for Patents, Washington, D.C. 20231, on October 18, 2002

Max Moskowitz

Name of applicant, assignee or
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Signature

October 18, 2002
Date of Signature

Respectfully submitted,

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